

04/21/99

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PTO/SB/05 (1/98)

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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE  
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PATENT APPLICATION  
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 1-21294

First Inventor or Application Identifier Hans Heinle et al.

Title Vehicle Cooling Radiator Arrangement

Express Mail Label No. EL300611164US

**APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents  
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Washington, DC 20231

1. ☐ \* Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original, and a duplicate for fee processing)
2. ☒ Specification [Total Pages 8]  
(preferred arrangement set forth below)
- Descriptive title of the invention
  - Cross References to Related Applications
  - Statement Regarding Fed sponsored R & D
  - Reference to Microfiche Appendix
  - Background of the invention
  - Brief Summary of the invention
  - Brief Description of the Drawings (if filed)
  - Detailed Description
  - Claim(s)
  - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 2]
4. Oath or Declaration [Total Pages 2]
- a. ☐ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))  
(for continuation/divisional with Box 17 completed)  
[Note Box 5 below]
- i. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting  
inventor(s) named in the prior application,  
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (useable if Box 4b is checked)  
The entire disclosure of the prior application, from which a  
copy of the oath or declaration is supplied under Box 4b, is  
considered to be part of the disclosure of the accompanying  
application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission  
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement verifying identity of above copies

**ACCOMPANYING APPLICATION PARTS**

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 C.F.R. § 3.73(b) Statement (when there is an assignee) ☒ Power of Attorney
10. ☐ English Translation Document (if applicable)
11. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)
14. ☐ Statement(s) ☐ Statement filed in prior application,  
(PTO/SB/09-12) ☐ Status still proper and desired
15. ☐ Certified Copy of Priority Document(s)  
(if foreign priority is claimed)
16. ☐ Other: .....

\* A new statement is required to be entitled to pay small entity fees, except  
where one has been filed in a prior application and is being relied upon.

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: \_\_\_\_\_ / \_\_\_\_\_

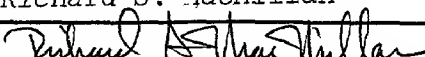
Prior application information: Examiner \_\_\_\_\_

Group / Art Unit: \_\_\_\_\_

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Signature		Date	04/21/99

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Date of signature and deposit - April 21, 1999

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
HANS HEINLE et al.	)	
	)	
Serial No.: not yet assigned	)	
	)	
Filed: herewith	)	
	)	
For: VEHICLE COOLING	)	Attorney Docket 1-21294
RADIATOR ARRANGEMENT	)	

Assistant Commissioner for Patents  
Washington, D. C. 20231

PRELIMINARY AMENDMENT

Honorable Sir:

Prior to an examination on the merits, please amend the above-identified application as follows:

IN THE CLAIMS

Page 6, Line 1	change "CLAIMS" to --What is claimed is:--.
Claim 3, Line 1	delete "or Claim 2".
Claim 5, Line 1	change "any preceding claim" to --Claim 2--.
Claim 8, Line 1	delete "or Claim 4 and in Claim 5, 6, or 7".
Claim 9, Line 1	delete "or any claim dependent thereon".
Claim 10, Line 1	delete "or any claim dependent thereon".
Claim 11, Line 2	change "any preceding claim" to --Claim 2--.
Claim 13, Line 1	delete "when dependent upon Claim 7".

Cancel Claim 14.

IN THE ABSTRACT


Page 8, Line 1 delete "Vehicle Cooling Radiator Arrangement".

Page 8, Line 7 delete "Figure 3".

REMARKS

This Amendment is made to eliminate multiple dependencies in the claims and to conform the application more closely with U.S. practice. In view of the amendments and above remarks, it is believed that the application is in condition for allowance. Accordingly, an early Notice Of Allowance is respectfully requested.

Respectfully submitted,



Richard S. MacMillan

Reg. No. 30,085

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TITLE: *VEHICLE COOLING RADIATOR ARRANGEMENT*

INVENTOR(S): *Hans Heinle, Michael Herold, Alois Sprentzel and Walter Wagner*

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ATTORNEY CASE NUMBER *1-21294*

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Date of signature and deposit - *April 21, 1999*

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## VEHICLE COOLING RADIATOR ARRANGEMENT

### Background to the Invention

The invention relates to an arrangement of three or more cooling radiators for a utility vehicle, such as an agricultural tractor.

Powerful utility vehicles, such as agricultural tractors, for example, require a number of radiators in order to re-cool the working media, such as coolant water for the engine transmission oil and hydraulic oil amongst others, as they become heated during use. These days, it is common practice to provide the requisite radiators in a parallel arrangement one after the other so that the coolant air flows through radiators. However, there are certain disadvantages to this layout. Arranging the radiators one after the other results in a high resistance to air flow which, apart from making it necessary to provide a disproportionately powerful fan, can also cause lead to an interruption in the flow, which results in the radiators becoming overheated. The lower temperature differential available to the radiators also makes it necessary to provide radiators of a larger size. In addition, any dirt which gets into radiator fins, particularly those of the radiators at the rear, is very difficult or totally impossible to remove completely without dismantling the radiators. The presence of dirt poses the risk of local overheating in the radiators.

### Summary of the Invention

An objective of the invention is to provide an arrangement of three or more radiators of the generic type outlined above which is efficient, easy to maintain and not susceptible to failure.

According to the invention, an arrangement of cooling radiators is provided as set out in Claim 1 hereto.

The advantage of this arrangement is that the flow resistance is reduced when compared to three parallel radiators one after the other, which means that smaller radiators can be used to achieve the same cooling effect. Access to the radiators is also easier.

Preferably, the arrangement also has the features set out in Claim 2. In this arrangement, it is ensured that there are no "short circuits" of air flow resulting in localised hot spots on any of the radiators. Preferably access is provided means of the features set out in Claim 3.

Other preferable features are set out in the dependent Claims.

In general, the arrangement specifically described herein provides an inner chamber surrounded on most sides by radiators, which makes for ready access to the sides of the radiators on the interior, provided one of the radiators is pivotably mounted or detachable. Any dirt which has become stuck to the radiator fins can be removed easily using compressed air for example.

In addition, the radiator arrangement reduces the overall flow resistance in the radiators, resulting in low flow losses, thus providing a system of radiators which operates satisfactorily, even with a conventional fan, and is not susceptible to failure. This can largely be ascribed to the fact that relatively large cooling surfaces can be provided by arranging the radiators in the layout proposed by the invention, allowing the air to flow at a low rate and the fact that the entire coolant air induced, which does not contain any outside air, has to flow through two radiators only. Not to be overlooked, however, is the fact that a part of the dirt which might be contained in the air flowing through the radiators at the front is left in the inner chamber, which not only means that the efficiency of the rear radiator remains unaffected for a longer time but also the under-pressure prevailing in the inner chamber during this time is that required to induce a sufficient quantity of coolant air through the radiators connected at the front end.

In one practical arrangement of the invention, the radiators are mounted on a common radiator support. With this design, the radiator system can be assembled beforehand. This

means that the entire radiator system can be provided as a unit which is pre-assembled by the radiator manufacturer and fitted as part of the assembly process by the vehicle manufacturer. Advantageous features of the radiator support are set out in some of the following dependent claims.

In the case of cooling systems in which not all the possible locations for radiators will be used, for example because the vehicle does not have a hydraulic system and does not therefore require the radiator for the hydraulic oil, a practical solution is to replace the radiators arranged to front of the bracket with air permeable plates, whose resistance to the passage of air corresponds to that of the radiators which they have replaced. The under-pressure generated in the inner chamber due to the fan will then remain the same as it would be in a cooling system with a radiator for hydraulic oil and hence also the through-put of air through the system.

#### Brief Description of the Drawings

An embodiment of the invention will now be described in more detail below with reference to drawings. Of these:

Figure 1 is a perspective view of a cooling system seen from the front;

Figure 2 is a side view of the cooling system of Figure, and

Figure 3 is an exploded diagram of the cooling system of Figure 1.

#### Detailed Description

The cooling system illustrated in the drawings is designed to be provided as a pre-assembled unit which can be mounted and secured directly onto a vehicle frame, not illustrated, in front of a fan.

This unit has a radiator support 1, on which several radiators are arranged. These are a rear water radiator designated by reference 2, a gear oil radiator 3, a booster air radiator 4, a combined radiator 5 for hydraulic oil and fuel as well as a condenser 6 for the air-conditioning system. Depending on the vehicle and the application for which it will be used, radiators which are not required can be replaced by radiators for other media or by air

permeable plates. This being the case, the replacement plates can be designed in such a way that they have the same resistance to through-flow as the radiator which they replace.

Being the radiator with the largest surface area in this embodiment, the water radiator 2 is mounted in the interior of a bracket 1b, which is secured at the rear end region of the radiator support 1 so as to stand upright on the lower part 1a thereof. A fan deflector guide 1c is fixed to the bracket 1b behind the water radiator 2. All the other radiators are arranged in front of the bracket 1b in the longitudinal direction of the vehicle. Arranged the farthest forward, parallel with and at a long distance from the water radiator 2 is the condenser 6. The region between the water radiator 2 and the condenser 6 is delimited on the one side by the radiator 3, on the other side by the radiator 5 and at the top by the radiator 4, thereby forming an inner chamber 7. At their bracket-ends, the radiators 3 to 5 are secured to the bracket 1b at the peripheral regions and are joined to one another at their adjacent peripheral regions. The radiators 3, 5 at the sides are provided with plug elements 3a, 5a on the underside thereof and are supported in matching counter elements on the lower portion 1a. In order to fix the plug connections, the radiators 3, 5 are braced at their front end region with the lower portion 1a by means of long, vertical retaining screws 8.

Various points at which the radiators 3 to 5 abut with one another and with the radiator support 1 are designed so as to be air-tight due to matching contours of the radiators and/or by the use of appropriate sealing materials, so that air can enter the radiators via the inner chamber 7 only. As can be seen, the radiators 3, 5 at the sides are provided with matching formed plates 3b, 5b for this purpose, which fill the region between these radiators and the radiator 4 extending down towards the front on a level with the condenser 6.

The condenser 6 is not joined to either of the adjacent radiators 3 to 5. Instead, it is secured onto a frame 9 which can be pivoted by means of lateral joints 10 about one of the retaining screws 8, in order to provide ready access to the inner chamber 7 for maintenance work. The other retaining screw 8 is used to secure the condenser 6 in the closed position in which it is sealed against outside air by means of known locking elements 11, 12.





## CLAIMS

- 1 An arrangement of 3 or more cooling radiators in a utility vehicle such as an agricultural tractor characterised in that the radiators together define three or more sides of a chamber.
- 2 An arrangement of radiators as claimed in Claim 1 characterised in that the said chamber is bounded on all sides by radiators or other wall members.
- 3 An arrangement as claimed in Claim 1 or Claim 2 characterised in that at least one of the radiators or wall members is releasably mounted to provide access to the chamber.
- 4 An arrangement as claimed in Claim 3 characterised in that the said releasably mounted radiator or wall member is pivotally mounted with respect to the radiators or other radiators.
- 5 An arrangement as claimed in any preceding claim characterised in that the radiators and/or wall members are mounted on a common support.
- 6 An arrangement as claimed in Claim 5 characterised in that the support consists of a base part and a bracket upstanding from the region of one end of the base part.
- 7 An arrangement as claimed in Claim 6 characterised in that a water cooling radiator is mounted with an airtight seal in the said upstanding bracket.
- 8 An arrangement as claimed in Claim 3 or Claim 4 and in Claim 5, 6 or 7, characterised in that, with the exception of the said releasably or pivotally mounted radiator, all the said cooling radiators are sealingly joined to each other and/or to the common support to form a rigid unit.

- 9 An arrangement as claimed in Claim 6 or any claim dependent thereon characterised in that the cooling radiators defining two opposed sides of the chamber are retained on the base portion by means of a plug and socket connection together with retaining screws.
- 10 An arrangement as claimed in Claim 2 or any claim dependent thereon characterised in that some or all of any said wall members comprise air permeable plates, having a predetermined resistance to air flow therethrough.
- 11 An agricultural tractor including an arrangement of cooling radiators as claimed in any preceding claim.
- 12 An agricultural tractor as claimed in Claim 10 having an engine hood which slopes downwardly towards the front thereof and in which the said cooling arrangement is enclosed at the forward end thereof, the cooling radiator arrangement including front and rear substantially parallel planar radiators, the major faces thereof facing substantially in the direction of movement of the tractor, and the said rear radiator having a major face of greater area than that of the said front radiator.
- 13 A tractor as claimed in Claim 12 when dependent upon Claim 7 wherein the said rear radiator comprises the said cooling water radiator.
- 14 An arrangement of cooling radiators substantially as herein specifically described with reference to the accompanying drawings.

## ABSTRACT

### Vehicle Cooling Radiator Arrangement

An arrangement of radiators (2-6) for a utility vehicle, eg an agricultural tractor, comprising three or more cooling radiators which together define a chamber (7), optionally with some of the walls formed by perforated plates instead of radiator elements. One of the radiator elements may be pivotally mounted with respect to the others to provide access to the chamber. The arrangement of radiators may be mounted on a common support (1).

Figure 3

Fig. 1

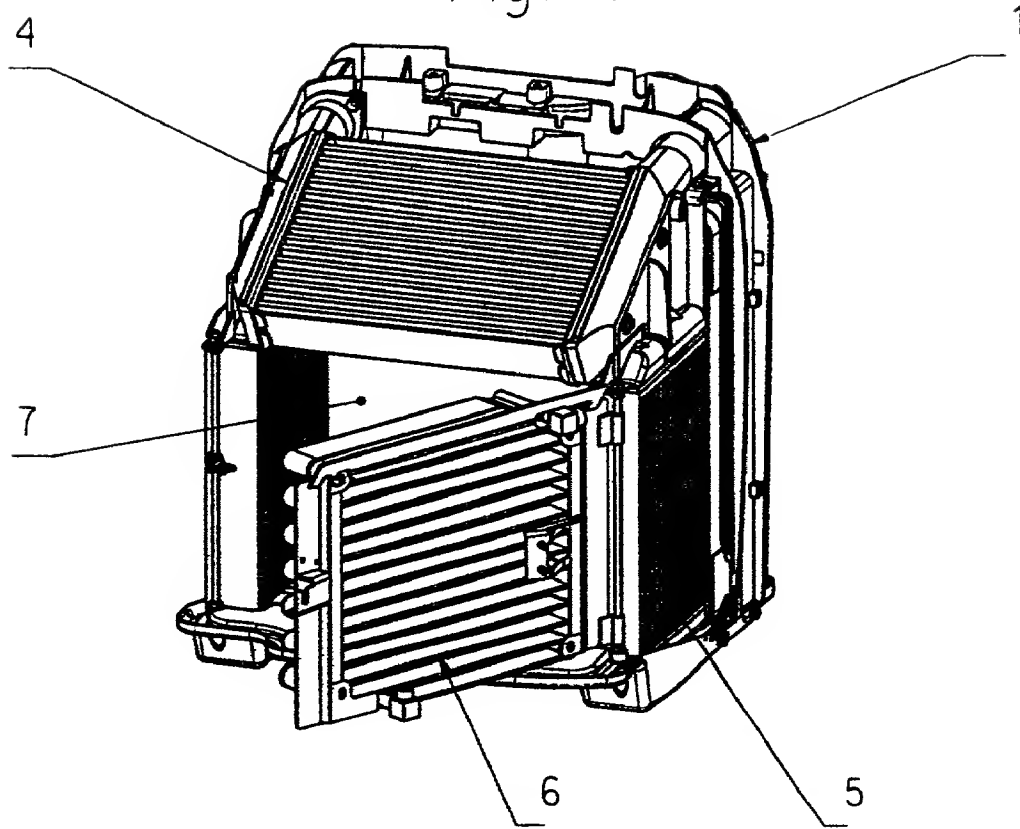


Fig. 2

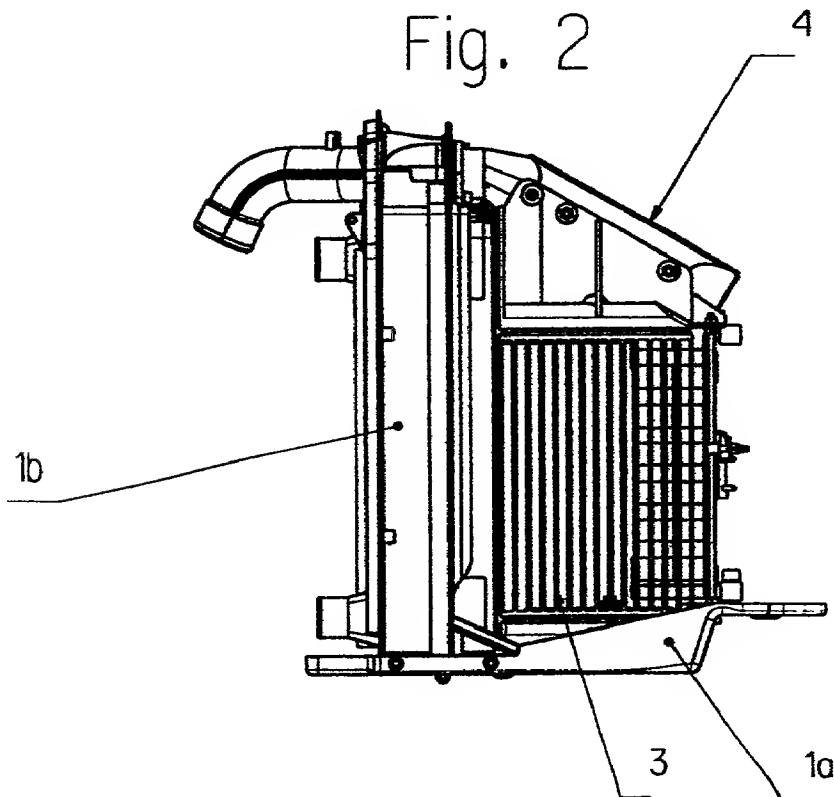
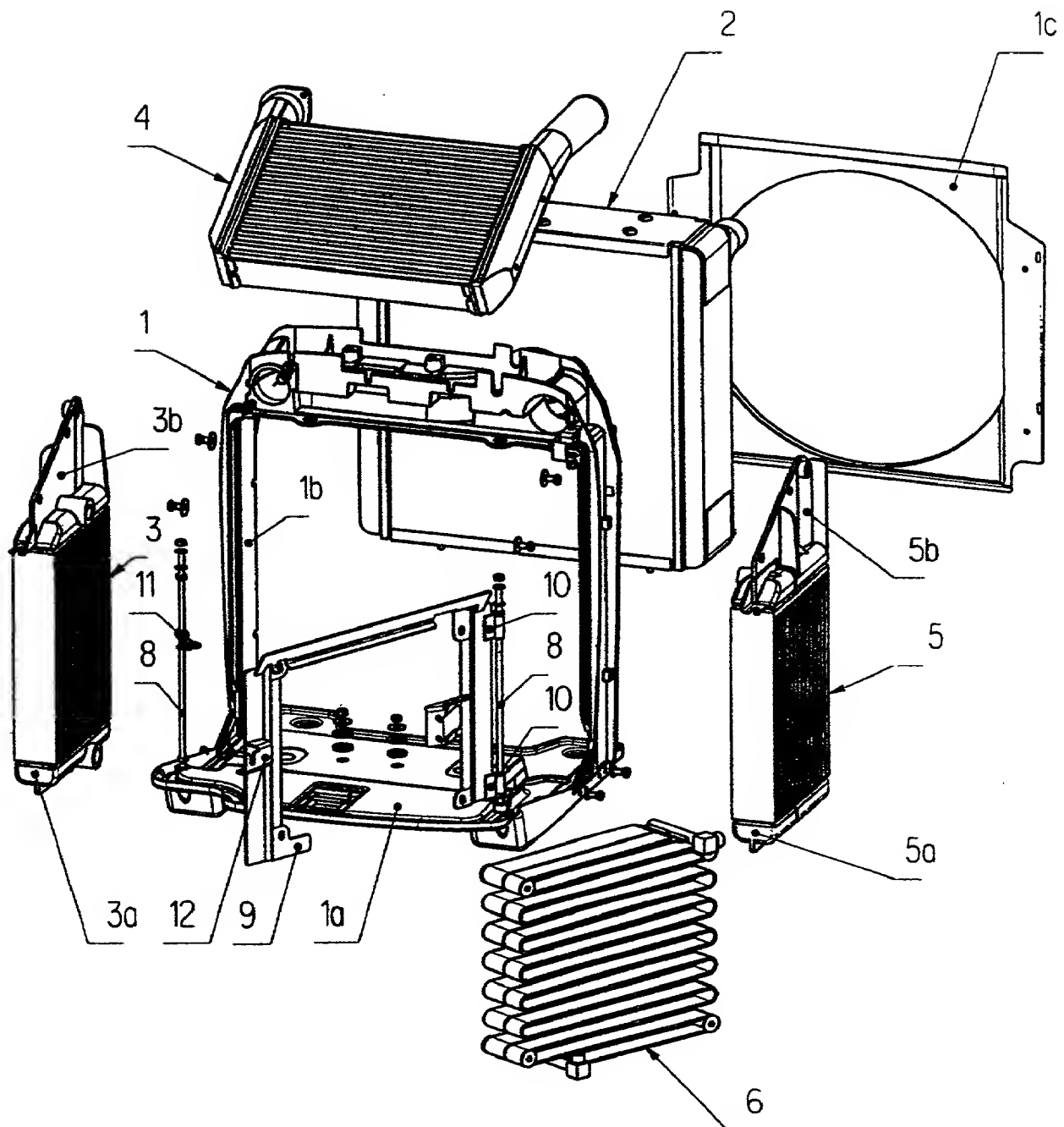


Fig. 3



COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

VEHICLE COOLING RADIATOR ARRANGEMENT

the specification of which is attached hereto unless the following box is checked:

[ ] was filed on \_\_\_\_\_ as U.S. Application Number or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Claimed	
<u>9808293.6</u>	<u>U.K.</u>	<u>4/21/98</u>	<u>X</u>	
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>          </u>	<u>          </u>
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

                                           
(Application No.) (Filing Date)

                                           
(Application No.) (Filing Date)

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

                                                                
(Application No.) (Filing Date) (status - patented, pending, abandoned)

                                                                
(Application No.) (Filing Date) (status - patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith with full power of substitution and revocation: Richard S. MacMillan, Reg. No. 30,085; Mark J. Sobanski, Reg. No. 29,700; Oliver E. Todd, Jr., Reg. No. 24,746; Ted C. Gillespie, Reg. No. 27,981; Donald R. Fraser, Reg. No. 17,919; William J. Clemens, Reg. No. 26,855; A. Michael Tucker, Reg. No. 32,539; Gary M. Sutter, Reg. No. 31,574; John B. Molnar, Reg. No. 31,914; Larry R. Meenan, Reg. No. 33,423; Douglas V. Pavelko, Reg. No. 36,888; Allen W. Inks, Reg. No. 37,358; Peter J. Rashid, Reg. No. 39,464; Thedford I. Hitaffer, Reg. No. 38,490; Scott A. Blake, Reg. No. 40,515; and Robert F. McBeth, Reg. No. 43,783.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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